# UPPER SIKANNI MANAGEMENT PLAN

Ministry of Environment, Lands and Parks
and
Ministry of Energy, Mines and Petroleum Resources

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## PREFACE

The Ministry of Environment, Lands and Parks (MELP) recently completed wildlife capability mapping for the Muskwa-Kechika region of northeastern British Columbia. This mapping exercise confirmed the provincial and international importance of the Northern Rocky Mountains and eastern foothills for wildlife and wilderness values. Because of the abundance and diversity of large mammal species, this area is one of the highest priority areas in the province for the protection and management of wildlife species. The following wildlife species have been included in this mapping exercise: grizzly bear, Stone sheep, elk, black bear, moose, caribou, Plains bison, mountain goat, mule deer and white-tail deer. Recent overview inventories of the Upper Sikanni River and its tributaries, have demonstrated that viable populations of sportfish species including rainbow trout, Arctic grayling, and mountain whitefish exist within the watershed.

The Muskwa-Kechika region contains some of the province's greatest potential for large accumulations of natural gas. Natural gas exploration and development is expected to intensify over the next few years, particularly along the eastern slopes. Industry operations and activities include low impact seismic explorations, and the construction of roads, wellsites, pipeline rights-of-way, power lines and compressor facilities, and establishes precedent for additional activity within an area. Although some petroleum and natural gas development activities may be small in scale, they can have cumulative environmental impacts, particularly in areas with high wildlife and wilderness values. It is important that the location, nature and extent of petroleum and natural gas exploration activities in sensitive areas be carefully managed to sustain environmental resource values while insuring that opportunities for continued economic benefits from a healthy oil and gas industry are maintained.

The Muskwa-Kechika region also contains timber and mining values and provides exceptional recreation opportunities. Although at this time recreation usage is low and there are no immediate timber and mining plans for the Upper Sikanni, the potential for future usage and extraction is recognized. Current mineral deposits in the area, taken from the Revised Minerals Inventory Maps, show mineral deposits such as copper, zinc, barite and barium.

The Ministry of Energy, Mines and Petroleum Resources (MEMPR) has received a number of requests for oil and gas tenure in the Upper Sikanni Chief river drainage and has deferred offering the tenures for competitive bid for two years to provide MELP with sufficient time to complete initial wildlife and habitat assessments in the area. There are a number of existing oil and gas tenures in the area and some preliminary geophysical exploration and drilling has occurred . The Upper Sikanni Management Plan (USMP) has been developed to provide guidance and direction for the continued exploration and potential development of natural gas in this sensitive area.

Until such time as the Fort St. John Land and Resource Management Planning (LRMP) processes define land use zoning and protected areas under the Protected Areas Strategy, the USMP will provide interim working guidelines. The USMP will be considered as a pilot project, for the further development in the Muskwa-Kechika, and may also be of use to the northeast LRMP tables as they address special management zoning issues. The USMP will assist both MELP and MEMPR in ensuring that important environmental resource values are sustained, and that opportunities for environmentally responsible resource development are maintained.

# INTRODUCTION

The USMP has been developed primarily to ensure that impacts to sensitive wildlife and habitat from oil and gas exploration and resource developments are minimized. The plan consists of: a description of broad habitat types, guidelines for works within the Upper Sikanni drainage derived from habitat descriptions, a list of wildlife species, an annotated map identifying areas subject to specific management and operational terms included as conditions of tenure. The plan will apply to petroleum and natural gas tenures issued in the Upper Sikanni drainage as provided for in the protocol agreement between MEMPR and MELP. Both agencies recognize both the high potential for natural gas development and the high wildlife habitat values in the Upper Sikanni drainage.

The Ministry of Environment, Lands and Parks has determined that the Upper Sikanni drainage should be managed on an ecosystem based approach, as the optimal method of accommodating both human use and resource extraction, while sustaining a long term, strong wildlife population. This plan calls for the issues of connectivity and biodiversity to be applied in all stages of development and to apply to all species.

Access development for the oil and gas industry has major impacts on elk, moose, Stone sheep, mountain goat, caribou, Plains bison, grizzly bear, wolverine, gyrfalcons, wolves, and all fish species of the Sikanni River and watercourses. Access development increases variety of uses which can fragment wildlife ranges, increase hunting/fishing pressure, and ultimately reduce habitat suitability. Impact mitigation strategies will require monitoring and adjusting to insure they are compatible with the objectives of the plan.

The primary habitat management objectives of the plan are consistent with the Biodiversity Guidebook, 1995, developed for the Forest Practices Code and include:

- maintenance of connectivity of ecosystems in such a manner as to ensure the
- continued dispersal and movement of forest/alpine dwelling organisms across the landscape. Linkage corridors between protected areas and sensitive development zones. These areas are critical in that they provide for seasonal migration, escape cover and gene pool exchange.
- maintenance of a variety of patch sizes, seral stages, forest stand attributes and structures, across a variety of ecosystems and landscapes. Maintaining a full range and appropriate distribution of habitat types across the landscape, emphasizing rare habitats (such as grasslands and riparian habitats).
- provision of un-harvested areas of sufficient size to maintain forest interior habitat conditions, as well as prevent the formation of excessive edge habitat (Biodiversity Guidebook 1995).

While this plan may not meet all objectives of all sectors, it represents the best opportunity to demonstrate that a balanced approach to resource management can be achieved through inter-agency cooperation and sound development practices.

The Fort St. John LRMP process is currently developing strategic objectives and strategies that encompass the USMP management area. Until such time as this process defines land use zoning the USMP will provide direction for resource development.

## PLAN AREA

Situated in the northeastern part of British Columbia, the USMP encompasses approximately 1832 sq. km. Located where the extensive boreal plains and muskeg of the east meet the Rocky Mountains, the Upper Sikanni Chief River watershed is significant in terms of wildlife species groupings, remoteness, minimal development, low human population and supports a wide ranging predator-prey system.

The most westerly edge of this area consists of varied terrain which includes jagged peaks, cliffs, talus slopes and sparsely vegetated alpine slopes. The mid to eastern end of the subject area, the habitat changes from alpine to longer, wider valley habitat, with a varied forest canopy. Grassland habitat occurs in the eastern edge. Windward slopes and exposed ridge crests remain free of snow for extensive periods during the winter. Due to its northern latitude, inland location, and high elevation, the climate is severe and the growing season short. This is the northernmost known occurrence of Englemann spruce in the Rocky Mountains.

The plan area lies within the Fort St. John Forest District and is comprised of the following biogeoclimatic zones (forest types):

Alpine Tundra - (AT)

The alpine tundra, essentially a treeless region characterized by a harsh climate, is dominated by dwarf shrubs, herbs, mosses and lichens. This zone has high recreational appeal. It also provides important range for caribou, mountain goats and mountain sheep. Due to the severe climate it is extremely sensitive to use. Disturbed landscapes require decades, or even centuries, to recover to their natural states. The AT zone occurs above approximately 1400 m in northeastern British Columbia. The most common krummholz species are subalpine fir, Engelmann spruce and white spruce. A krummholz is typically a high elevation, stunted tree, open habitat, characterized by islands of the above species, intermixed with a dense shrub cover of willows and scrub birch.

Spruce-Willow-Birch - (SWBmk)

The SWBmk zone is the most northerly subalpine zone in British Columbia. Elevations range between 1000 and 1700 m, and is commonly the subalpine zone above the Boreal White and Black Spruce zone in northern British Columbia. At lower elevations, the zone is characterized by open forests of primarily white spruce

and subalpine fir; upper elevations are dominated by deciduous shrubs including scrub birch and willow. In some high wide valleys, cold air collects resulting in a mosaic of scrub, grassland and wetlands on valley floors below a band of forest on the valley sides. This zone provides extensive moose, caribou and, in the east, elk habitat.

Boreal White and Black Spruce - (BWBSmw2)

The BWBSmw2 biogeoclimatic zone occurs at elevations ranging from approximately 350 to 1100 m. The regional climate is relatively moist and warm with a longer growing season than the higher elevation BWBSwk. The following applies to both the BWBSmw2 and the BWBSwk2. The forests are dominated by white spruce or aspen. Forest fires are frequent throughout the zone, maintaining most of the forests in various successional stages. Forest harvesting in BWBS is relatively active and will continue to grow with the increased use of trembling aspen and balsam poplar. The Upper Sikanni has, at this time, no harvesting of the BWBS zone. The BWBS zone has the least snowfall of all the northern zones and consequently is very important for wintering ungulates. The zone provides prime habitat for fur-bearing mammals.

Boreal White and Black Spruce - (BWBSwk2)

The BWBSwk2 biogeoclimatic zone occurs at elevations ranging from approximately 900 to 1300m. The climate is wetter and cooler with a shorter growing season than the BWBSmw. The forests are dominated by white spruce or lodgepole pine.

Historically the Upper Sikanni Chief River has accommodated a variety of uses by both First Nation and settler communities, such as: trapping, guiding and outfitting, hunting, fishing and small scale mining operations. This region is within the ethnolinguistic area of the Athapaskan; Sekani/Beaver (Halfway River Indian Band and Prophet River Indian Band - Treaty 8). Both of these First Nations communities rely extensively on fish and wildlife for sustenance, and trapping is an important component of their way of life. There are known First Nations' grave sites in the subject area.

## METHODS

The information depicted on the annotated map, as with all information within this report, was derived from a variety of sources. The main source of information was from the Upper Sikanni Chief River Watershed (Muskwa Foothills Project 1994) broad level biophysical habitat mapping, which was completed by MELP. As a secondary source of information MELP utilized the knowledge of its own staff, trappers and First Nations, as well as the guide and outfitter which occupied the area at the time. MELP wishes to acknowledge how useful and crucial these contributors have been in molding this project. Their knowledge of the area and of certain species has proven an invaluable resource.

Research was conducted on whether any known archeological sites are within the USMP. Ongoing archeological studies are being conducted by the Halfway Band at this time; several sites have been identified. It is evident that there is a need for further archeological studies before any development occurs.

Recreation issues have been identified by the Peace River Alaska Highway Tourist Association and the Ministry of Forests. Interviews were conducted to bring forth areas of interest and areas of concern, with respect to recreation and tourism, within the USMP. However, the main focus of this plan is wildlife habitat management.

The annotated map was constructed from both a 1:250,000 and 1:20,000 TRIM mapping base. Tenure information was derived from current records from Energy, Mines and Petroleum Resources. McElhanney Associates of Fort St. John completed the manual digitizing of information from the 1:50,000 map base.

The generalized broad habitat classes were derived from satellite imagery, aerial photographs, forest cover maps and existing wildlife knowledge. This information is useful for providing general procedures and restrictions in terms of oil and gas development. However, more detailed information is required to properly address site specific issues and to more precisely assess local wildlife and fisheries needs. The current data only provides this habitat plan with baseline information on distribution and range. Development plans (pre/post assessment and monitoring) must focus on identifying the impacts of oil and gas operations on wildlife within the Upper Sikanni. Some of this information may have to be gathered by the proponent prior to development approval. Ongoing telemetry studies on the Plains bison, and further wildlife and fisheries inventories conducted by BC Environment will continue to help to fill some information gaps.

## MAPPING

The mapping consists of an Upper Sikanni base map and a broad habitat map for the Upper Sikanni. These maps have been produced at a 1:50,000 and 1:100,000 scale, and both maps are in large formats and accordingly cannot be attached to the plan; report sized versions have been attached to the plan but should only be used to obtain a general overview of the plan area and broad habitat locations.

The Upper Sikanni Base Map contains the following data: water drainages, contours, trails, high fishery value sites, grazing leases, privately owned property, roads, seismic lines, wellsites, recreational reserves, bridges, cabins, airstrips, ecological reserves, archeological sites, existing and proposed tenures, 1300m elevation, proposed Protected Areas, and pipelines.

The Broad Habitat Map, in addition to containing all data on the base map, illustrates the approximate borders of all zones and habitats discussed in Broad Habitat Types. The map shows the approximate borders of the two sensitive zones: in pink and green. The map indicates the approximate locations of each habitat, using symbols. These habitats and their designations are explained in greater detail in the Broad Habitat Type section.

## GENERALIZED BROAD HABITAT TYPES, DESCRIPTIONS AND MANAGEMENT STRATEGIES

### 1.Closed Forest Ty pe

DEFINITION/DESCRIPTION:

The Closed Forest Type consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Cool Aspect, Well Drained, Boreal, Closed Subalpine and Warm Aspect.

Typically, a closed canopy dense coniferous forest consists of varying components of spruce, black spruce, lodgepole pine, subalpine fir and small intrusions of deciduous species such as aspen, balsam poplar and birch. The forest understory generally consists of moss, labrador tea, some alder willow and various shrub and herb species. This habitat is found in the valley bottoms and lower slopes with gentle to moderate gradient. The closed forest habitat in this area is within the BWBS and SWB biogeoclimatic zones. The closed forest provides the best thermal and hiding cover for many species of birds and mammals.

Many species use this habitat for escape cover, perching, nesting and some species utilize the area year-round. This habitat is most valuable where there are natural openings or waterbodies as it then increases the diversity of habitat and allows for use by a greater number and variety of species. Large continuous areas of closed forest are important for species such as fisher, martin, squirrels and boreal owls.

The greatest attributes of the closed forest type from a wildlife perspective are: snow interception capabilities; the security provided by the closed canopy to small mammals for protection from avian predators; escape cover for prey species from land predators; its temperature moderating abilities which provide relief during period of temperature extremes; and, its effectiveness in isolating and minimizing human disturbance by shielding it from view by its natural revegetating abilities.

There are four blue listed species that utilize this habitat: grizzly bear, wolverine, fisher and bald eagle

DISTRIBUTION:

The closed forest habitat is extensive on a regional basis but in the Sikanni watershed, it occurs mostly in the immediate Upper Sikanni River valley and in the eastern half of the project.

MANAGEMENT STRATEGIES:

Low Sensitive - This habitat type has been developed extensively by the petroleum and forest industries east of the USMP. It is readily reclaimed and small to moderate disturbances tend to be screened by this forest. Due to its linear nature, oil and gas development can generally be practiced here with fewer negative effects on wildlife than in other adjacent habitat types. Pre-planning must be done to minimize disturbances and proper reclamation must be undertaken after development. Development can occur within this habitat type but the following practices to minimize negative impacts on species utilizing this habitat are expected:

- Minimize clearing sizes for pipelines, roads, wellsites, other development;
- Distribute coarse woody debris on disturbed sites during reclamation;
- Vary the shape of clearings to mimic natural forest openings and increase edge effects;
- Prompt revegetatation of disturbed areas using original tree and bush species;
- Dogleg linear openings to minimize site disturbances;
- Consideration of visual impacts from all distances and discretion when locating development; and,
- Maintain short sight distances in corridor developments.

Notes:

1. Some warm aspect forested habitats constitute Class 1 grizzly bear range. Warm aspect forests also have the potential to provide ungulate winter range. Where warm aspect forests provides both ungulate winter range and grizzly bear habitat, development will be restricted. This will be determined on a site specific basis, when more detailed development plans and field data have been collected.

2. Some portions of this habitat may be required as wildlife travel corridors, managed as a buffer for more sensitive open habitats (meadow complexes and mineral licks) or lakes and streams.

**2.Open Forest Ty pe**

DEFINITION/DESCRIPTION:

The Open Forest Type consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Forest Wetland and Open Subalpine Forest.

This forest type is similar in composition to the closed forest type but the canopy closure and understory layer differ significantly. This forest canopy is more open, allowing more light to reach the forest floor, enhancing shrub and herbaceous growth and terrestrial lichens. The open canopy is a result of a lower density of mature trees caused by marsh climatic conditions, nutrient poor soils, poor drainage

and/or fire history. Open forest dominates the higher elevation forest types and often is the transition zone from closed forest type to the subalpine meadow/ parkland and alpine. Although this habitat provides less security than closed forest in terms of hiding cover for larger animals, it plays an important role in providing escape cover from the adjacent open habitats such as alpine or warm aspect grassland. Open forest is noted for:

- Shrub/herb and lichen producing understory providing important winter/summer forage for large and small mammals and birds;
- Providing hiding/escape cover for animals utilizing adjacent open habitats; and,
- Moderating visual impacts of development and disturbance.

It is important winter range for moose, Plains bison and caribou. Other species that utilize this habitat include the following blue listed animals: grizzly bear, wolverine, fisher, Smith's Long Spur and bald eagle. The shrub/herb understory provides a home for numerous birds and small mammals

DISTRIBUTION:

The open forest habitat is extensive in the Upper Sikanni watershed. It is generally concentrated along the valley bottoms but also occurs on the upper slopes of these valleys and in draws of the mountain ranges. A large percentage of this habitat is in the western half of the project area, running north/south from Cranswick Lake area to the headwaters of Sidenius Creek.

MANAGEMENT STRATEGIES:

Low Sensitive - The effects of oil and gas development on this habitat type are predicted to be similar to those of the closed forest type and this habitat type will be managed with the same objectives as the closed forest type. Given the more open nature and the cumulative detrimental visual effects created by development, planning must address minimizing visual impacts. Development buffers will be required where this habitat is adjacent to open habitat types of lakes, streams and grasslands.

3.**Shrub/ Grass Lowland - (Coloured pink on map)**

DEFINITION/DESCRIPTION:

The Shrub/Grass Lowland consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Wetland and Cold Air Drainage/Grassland.

This habitat type is found in low elevation wet areas and is characterized by low dense shrubs, scrub birch, willow, grasses and sedges. These areas remain treeless due to low nutrient soils, poor drainage and cold air drainage. Meadows occur and create a mosaic

of natural openings within the forest types, providing edge habitats which promote abundance and diversity of animal species.

Many raptors, including the Peregrine falcon (red listed), forage in open areas such as the shrub/grass lowland where small birds and mammals are abundant. Large mammals such as moose, caribou and elk also forage in these meadows and Plains bison utilize them extensively in winter in lower snowfall areas. Where shrub/grass lowlands occur adjacent to streams or lakes, it provides nesting habitat for waterfowl. There are five blue listed species that occur in this habitat: Plains bison, grizzly bear, wolverine, Smith's Long Spur and bald eagle.

DISTRIBUTION:

Shrub/grass Lowland occur in only a small percentage of the total area and therefore preservation of the habitat is critical. It is generally found in the wetter sections of the valley bottoms. A large portion of this habitat is pocketed along the Sikanni River at Jesson Creek and Sidenius Creek.

MANAGEMENT STRATEGIES:

High Sensitive: The siting of wells and related processing facilities is prohibited. Access through these areas for geophysical exploration, pipelines and roads will be permitted but should be avoided; any activity will require site specific management.

The openness of this habitat, promotes species diversity and development should be avoided. Meadows require treed, visual buffers to isolate them from development activities and in areas where the shrub/grass lowlands create a complex of meadows and interchanging forested areas. They must be managed as a complete unit that prevents habitat fragmentation. Any unavoidable development must be sufficiently buffered to prevent disturbances to wildlife utilizing this open habitat.

It is a critical winter range for Plains bison.

**4.Warm A spect Grassland - (Coloured pink on map)**

DEFINITION/DESCRIPTION:

The Warm Aspect Grassland consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Warm Aspect Grassland.

Typically this is dry grassland habitat dominated by perennial grasses and forbes. In the Upper Sikanni watershed, this habitat is limited to steep, south facing slopes or alpine ridges. This ecosystem can be initiated and perpetuated by fire, either natural or human-caused. Extensive grazing by ungulates help maintain this early seral habitat. Mule deer, Plains bison, Stone sheep and elk depend heavily on these area for foraging in winter months as they can easily access suitable forage species in low snow or even

snow-free conditions. Falcons, hawks and eagles use this open terrain for hunting. Mountain bluebirds, voles and grouse are also found here. This is one of the few habitat types where several large ungulate species will occur together in significant numbers to create a unique wildlife viewing opportunity. These areas also tend to green up in the early spring providing an important food source for ungulates and for recently emerged black and grizzly bears.

DISTRIBUTION:

The Warm Aspect Grassland habitat is very limited in the Upper Sikanni watershed. The majority of the habitat occurs in the easterly end of the subject area, along the south facing slopes of the Upper Sikanni River.

MANAGEMENT STRATEGIES:

High Sensitive: The siting of wells and related processing facilities is prohibited. Access through these areas for geophysical exploration, pipelines and roads will be permitted but should be avoided if possible.

This habitat is limited and is very important to several species for winter range. The openness and location of these areas on steep slopes make them very sensitive to activity not only within the habitat itself but also in adjacent habitats directly below. The steepness of these slopes increases the chance of slumping and erosion. For animals utilizing this habitat, adjacent escape cover/terrain is essential, therefore suitable habitat adjacent to the warm aspect grasslands must be preserved to provide an avenue of escape. For most animals this constitutes a forested area where they can find visual shelter and thermal retreat during temperature extremes. For Stone sheep or mountain goats adjacent alpine or rocky habitats will provide the best avenue of escape and should be avoided.

5.**Riparian - (Coloured pink on map)**

DEFINITION/DESCRIPTION:

The Riparian zone consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Riparian.

Riparian habitats are identified by the presence of vegetation requiring large amounts of free or unbound water and are typically a dense moist forested area, with shrub and forbes dominated understories, affected by seasonal flooding or high water tables associated with streams, rivers or small creeks. Riparian zones along a watercourse, typically consist of a wet/saturated habitat with emergent herbaceous species, sedges and rushes and shrubs, to a moist deciduous forest of aspen, balsam poplar, willow, dogwood, and further up the river bank a coniferous forest habitat with of Englemann spruce, pine, with a shrub and forbes understory. This habitat is affected by seasonal flooding or high water tables. The large mature deciduous and coniferous trees along a

streambank provide a future source of large organic debris in the aquatic environment; fallen dead trees and snags, eroded root structure and logs are the large organic debris that provide stream bed stability, cover and habitat for young fish. Disturbance and destruction of the riparian zone can have serious impacts to both the short and long-term viability and productivity of fish and fish habitat. The microclimate of riparian zones is different from that of the surrounding coniferous forest because of increased humidity, a higher rate of transpiration, more shade, and increased air movement. Riparian habitats also provide migration routes and travel corridors between summer and winter ranges.

There are five blue listed species that utilize this habitat: Plains bison, grizzly bear, western wolverine, fisher and bald eagle. As well, the Peregrine falcon, which is red listed, occur here. This area is used for breeding, nesting, feeding, and thermal and hiding cover, as well as providing food sources and natural streambank stabilization for fisheries values.

DISTRIBUTION:

This habitat type occurs in only a small percentage of the subject area, and is very critical habitat for almost all of the species noted in Appendix A. It is mainly situated along the banks of the Upper Sikanni River and is in scattered locations elsewhere along other drainages.

MANAGEMENT STRATEGIES:

High Sensitive: Riparian and wetland habitats play a critical role in maintaining biodiversity, and therefore must be managed with great care. The siting of wells and related processing facilities is prohibited. Access through these areas for geophysical exploration, pipelines and roads will be permitted but should be avoided if possible.

Despite the low occurrence, this habitat is important for numerous species. The habitat tends to be linear in nature, following the rivers and streams and bordering lakes. The situation may arise where access development is required through a riparian area, and in that situation strict guidelines must be followed and efforts to determine the shortest route, with the least disturbance must be made. Proposed crossings through riparian areas will be considered on a site specific basis. The objective is to maintain the natural habitat.

### 6.Av alanche Chute - (Coloured pink on map)

DEFINITION/DESCRIPTION:

The Avalanche Chute Zone consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Avalanche Chute.

This is, as the name suggests, an avalanche maintained habitat. Repeated avalanches prevent forest development and perpetuate an early seral habitat of shrub species such as alder and willow and in catchment areas, rich herbaceous growth. The lush vegetation found in these areas in summer is of prime importance to grizzly bears and is utilized by mountain goats, Stone sheep, black bears, ptarmigan, hoary marmots and numerous other species. In the Upper Sikanni drainage avalanche chutes are concentrated in the west end near the height of land on north and east facing slopes where snow accumulations are greatest. The chutes occur in rugged terrain, occur in narrow valleys and feature very steep slopes. These conditions create open exposure to any activity that may take place in valley bottoms or on opposite valley walls. There are four blue listed species that utilize this habitat: Stone sheep, grizzly bear, western wolverine and gyrfalcon.

DISTRIBUTION:

There are nine notable avalanche chutes in the Upper Sikanni, and they occur west of Mount Bertha and run north/south. The lower portion of the chute is directed towards valley bottoms or watercourses.

MANAGEMENT STRATEGIES:

High Sensitive: The siting of wells and related processing facilities is prohibited. Access through these areas for geophysical exploration, pipelines and roads will be permitted but should be avoided if possible.

If development adjacent to or nearby avalanche chutes is to occur, site specific planning will be required to ensure that avalanche habitats are not disturbed.

### 7.Subalpi ne Meadow Parkland

DEFINITION/DESCRIPTION:

The Subalpine Meadow Parkland consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Subalpine Meadow Parkland.

This habitat can best be described as the transition zone between the open or closed forest habitats and the unforested alpine habitats. By nature, it incorporates a mixture of both habitat types, but can be characterized as a open forest type with stunted subalpine fir and low growing shrubs. Ground cover is dominated by herbaceous species such as grasses, forbes, sedges and terrestrial lichens. Large open meadows occur and tree cover is interspersed in patches or clumps. This habitat often occupies mid to upper slope locations and contain tree densities so low as to have little influence on understory cover and ground moisture. The vegetation tends to be open due to the low productivity of these sites. These areas may provide significant winter range for caribou as there is extensive terrestrial lichen cover and low snow conditions. This

combination of alpine vegetation and sparse forest cover provides a unique habitat important to blue listed species like the Smith's long spur, grizzly bear, Stone sheep, Plains bison and gyrfalcon and the red listed Peregrine falcon.

DISTRIBUTION:

This habitat is extensive in the Upper Sikanni and is mainly found in the eastern half of the watershed. It lies between the vegetated alpine and the open subalpine.

MANAGEMENT STRATEGIES:

Medium Sensitive - Some areas of subalpine meadow/parkland are rated as class 1 grizzly bear and caribou habitat. Baesd on degree of sensitivity, siting of access, wellsites and and facilities should b avioded howeve it is recognized that terain may limit alternate options. These areas will be tied to high sensitive habitats to create a more complete and diverse habitat.

In this open habitat, disturbances tend to have greater impact than in forested types, however, short term disturbance is acceptable and careful reclamation can be successful when the project is complete. Buffer zones to protect adjacent alpine and attention to minimizing visual impacts on wildlife and the public will be conditions.

**8.Vegetated Alpine - (Colo ured green on map)**

DEFINITION/DESCRIPTION:

The Vegetated Alpine consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Alpine Plateau, Vegetated Alpine.

This is a high elevation, non-forested habitat dominated by grasses, sedges, forbes and terrestrial lichens. In depressions and wetter sites, lush herbaceous vegetation occurs; low shrubs, heather, avens and juniper will be prevalent. This habitat occurs on mountain and ridge tops or in high elevation basins above ≈ 1300m. The terrain varies from very steep, with rock outcrops, to gently rolling or flat plateau areas. Windward slopes and exposed ridge crests remain free of snow for extensive periods during the winter. They tend to be dry during the growing season, which limits plant growth. The vegetation tends to be scattered due to the low productivity of these sites and the dry conditions favour a high proportion of deep-rooted cushion and rosette plants. Snow often forms deep drifts; forbes, bunchgrass and dwarf evergreens occur.

Vegetated alpine areas represent critical winter and summer range for ungulate species like Stone sheep, caribou and mountain goat. Gyrfalcons, Peregrine falcons and bald eagles also occur. Wetter, more lush areas of alpine provide foraging areas for grizzly bears and hoary marmots. An abundance of ungulates also means scavengers like wolverines, and predators like wolves, will also use this habitat. To a lesser extent

moose, elk and Plains bison use alpine for foraging. More rugged areas of alpine provide calving areas

DISTRIBUTION:

This habitat exists throughout the subject area, but at times occurs in isolation from other vegetated alpine habitats. Connectivity of these isolated areas is a management objective.

MANAGEMENT STRATEGIES:

High Sensitive:

Alpine areas are a result of extreme climatic conditions. It is difficult to successfully reclaim these areas, particularly with natural vegetation such as lichen. Developments in the alpine can remain visible for a long time due to the openness of this habitat. Disturbance to animals at times such as late winter/early spring, calving or lambing periods, or during fly season, can have serious impacts on wildlife. Changes in habitat, interrupted feeding, and blocking travel and migration routes can create added stress and induce fear responses such as running and general nervousness thereby negatively affecting overall condition. It is critical that impacts to these areas be minimized as winter range for alpine species is very limited in the Sikanni watershed.

**9.Sparsel y Vegetated Alpine - (Coloured green on map)**

DEFINITION/DESCRIPTION:

The Sparsely Vegetated Alpine consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Sparsely Vegetated Alpine, Warm Aspect Alpine and Rock.

These alpine areas occur in the west end of the watershed where the climate and terrain are more extreme. Sparsely vegetated alpine habitats tend to consist of very steep rocky areas, cliffs, windswept dry ridges and plateaus, and talus slopes; unvegetated rock habitat has been included in this habitat grouping due to its existence around the outer edges of some sparsely vegetated alpine. Lack of moisture, lack of soil and harsh climate limit vegetation cover on these areas.
Hardy drought and cold resistant grasses and forbes can be found here, as well as a few species of low shrubs. Distribution is sparse and sporadic. Windward slopes and exposed ridge crests remain free of snow for extensive periods during the winter and they are dry during the growing season. Few species utilize this habitat in winter or summer. Those which do are Stone sheep, mountain goats, hoary marmots, some raptors, like the peregrine falcon, ptarmigan. The grizzly bear may use this habitat sporadically.

DISTRIBUTION:

On a regional basis, as with the vegetated alpine habitat, there is very little sparsely vegetated alpine habitat. The majority occur along the mountainous western portions of the Upper Sikanni.

MANAGEMENT STRATEGIES:

High Sensitive: Sparsely vegetated alpine has a low to moderate importance for wildlife habitat. This habitat is most valuable for recreational potential in association with undeveloped valleys and preserved as wilderness. The sheer ruggedness of the terrain precludes much of it from development.

10. **Lakes**

DEFINITION/DESCRIPTION:

The fisheries inventory for Trimble, Beattie and Marion Lakes is outdated and very limited; bull trout, arctic grayling, lake chub, suckers, mountain whitefish and rainbow trout are known to occur. Other lakes in the area have no documented information, such as Cranswick, Colledge and Sikanni Chief Lake. Typically lakes in the watershed are cold and have low productivity which makes them susceptible to fishing pressure. Waterfowl and shorebird species which utilize the lakes provide a prey base for gyrfalcons, Peregrine falcons, hawks and owls, and small land predators such as mink and fox. Bald eagles utilize lakes, nesting in nearby riparian and forested areas. Emergent vegetation in lake shallows provide an important food source for moose and muskrat. Beavers occur in lakes where deciduous tree species are adjacent.

DISTRIBUTION:

There are approximately 46 lakes within the Upper Sikanni watershed area. The larger lakes occur at higher elevations, in wide alpine valleys. Smaller lakes commonly occur along the main Sikanni valley and along or at the headwaters of tributaries of the Sikanni. Lake edges usually consist of a densely vegetated, marsh habitat. Lake depths range from 5m to 34m. There is a high occurrence of alluvial fans where streams enter into lakes. The Upper Sikanni watershed in comparison to other watersheds in Northeastern British Columbia has a high amount of lake habitat. This is highlights the significance of the watershed in terms of this specific habitat type.

MANAGEMENT STRATEGIES:

(See specific guidelines for fisheries, water and water crossings.)
The Guidelines provide for a 1 km zone around Trimble Lake. Any other development near lakes, ponds or wetlands must adhere to stated guidelines.

## 11. **Rivers/Streams**

DEFINITION/DESCRIPTION:

The rivers/streams in the Upper Sikanni watershed area provide spawning habitat for most of the species listed in the Lakes section above. Fish species inhabiting the rivers are an important food source for various wildlife species. There are four blue listed species that utilize this habitat: grizzly bear, western wolverine, gyrfalcon and bald eagle. The peregrine falcon, which is red listed, utilizes this habitat.

DISTRIBUTION:

There are approximately 13 named rivers/streams and many unnamed rivers/streams within the Upper Sikanni watershed. Those named rivers/streams are: Trimble Creek, Kohler Creek, Jesson Creek, Sidenius Creek, Colledge Creek, Gorrie Creek, Millet Creek, Loranger Creek, Chicken Creek, Bartle Creek, Embree Creek, Gautschi Creek and Moose Lick Creek.

MANAGEMENT STRATEGIES:

(See specific guidelines for fisheries, water and water crossings)
There will only be certain points along any watercourse in the Upper Sikanni watershed area where crossings can possibly occur. Refer to the Guideline Application section and the annotated map for further guidelines. Directional drilling will be considered in lieu of further road development or any crossing. Any proposals will be addressed on a site specific basis.

# OPERATIONAL GUIDELINES

## PURPOSE

The purpose of the Operational Guidelines is to provide proponents and or operators with a set of operating guideliens that will be employed at all levels, from geophysical survey operations, through initial well drilling , to the abandonment and reclamation of development. Activities within the USMP are subject to the guidelines which identify mitigation requirements. Proponents and operators are encouraged to discuss any areas of concern or questions related to the interpretation of these standards with MELP and MEMPR staff.

While specific operational techniques are identified in this plan they are by no means the only procedures permitted; the proponent and operators are encouraged to use and develop techniques that will reduce environmental impacts.

**The Upper Sikanni Management Plan and its operational component are to be used in conjunction with MEMPR's Oil and Gas Handbook. It is particularly important that all sub-contractors and their employees, be made aware of the conditions and guidelines of the USMP.**

These Guidelines do not alleviate the responsibility of proponents to comply with all federal and provincial legislation.

## General Guidelines

### Development Plans

Development plans for the Upper Sikanni drainage must be submitted to EMPR/MELP after consulting with other operating companies and tenure holders in the plan area. While recognizing the issues of confidentiality and competitive requirements, tenure holders or their representatives will be required to meet with MELP and MEMPR staff as a committee to ensure that opportunities for cooperative and coordinated access occurs. Proponents are expected to coordinate their plans and activities with other operators to the greatest degree practical to reduce area impacts. This can involve: pooling efforts and resources, and use of common roads, pipeline and utility right-of-ways, and general infrastructure; efforts should be aimed at minimizing surface impacts and disturbances. Plans for deactivation and rehabilitation of all roads and trails at the end of each permitted phase of development must be incorporated in development plan.

At each stage of development, a proponent will be required to provide the best estimate of the overall extent of development. This is required to ensure that the scope and potential impacts of the proposed total development are clearly understood and identified.

Applications for well licenses and other surface disturbances such as pipelines and facilities must be submitted as a part of the development plan so as to project scenarios and development infra-structure options.

1. Initial Drilling - It is recognized that a definitive plan is not feasible at the initial stages of development. However, it is important that with the first exploration well, some outline of the conceptual developments be provided. This information will be helpful to scope potential impacts and related issues. The development proposal should attempt to identify locations for additional wells, should address conceptual pipeline and production facility plans, identify access options, and include details of mitigation measures and options for minimizing the impacts of drilling, production, and testing operations. This phase will include baseline environmental information for the area of the potential development. This information, referred to as an Òimpact assessment,Ó is intended to assess specific sensitivities of a given area, as well provide a broader assessment of access routes and potential development, and to evaluate mitigation options.

2. Pool Delineation - Once a pool has been discovered, a more detailed delineation development plan inclusive of additional proposals and more definite plans for mitigation of impacts from drilling, production, access routes and testing operations (e.g. pads, innovative testing methods) will be required. Elaboration of pipeline/facility proposals would also be expected. Delineation proposals should include proposed well locations and associated drilling and waste management options, access, and test/short-term production scenarios.

3. Pool Development - Ongoing production and pool development will require an operational management plan encompassing all facilities, access routes, pipelines, and associated infrastructure. The overall objective is to minimize intrusion and continue to mitigate the impacts wherever possible.

**Habitat Impact Assessments**

The level of detail required to evaluate the impacts of a proposed activity or development will vary depending on which phase of the development being proposed. It may be necessary to conduct environmental baseline analysis to determine what specific sensitivities exist and to define appropriate levels of development and mitigation.

Proponents are to meet with local EMPR and MELP officials to identify site specific issues prior to plan submission. **It is particularly important that all contractors , sub-contractors and their employees, be made aware of the conditions and guidelines of the USMP.**

The level of detail expected in any habitat impact assessment will vary with project stage, the ultimate scope of development, the relative sensitivity of the proposed development area, and the extent of other existing and potential developments (both energy and non-energy related) in the area. The detail must be sufficient to allow examination of the impact of the proposed development on the environment.

All assessments methodology and reporting must meet government and professional requirement standards and are expected to address the following issues:

1. an analysis of site and access selection and construction procedures, with options;

2. baseline enviornmental conditions including the current status, habitat use, behavious of wildlife and plan communities with a specific focus on blue and red listed species, direct and indirect impacts of the project on species, coordination measures that could reduce/eliminate adverse impacts to species. This assessment should include studies on wetlands and riparian resources, critical wintering habitat, impacts on alpine habitat and fisheries, and direct impacts on specific wildlife species. Critical lambing and calving grounds and critical rutting will be verified by proponent funded assessments/inventories;

3. impact mitigation options and plans to mitigate impacts;

4. monitoring and reporting plans;

5. results of public consultation programs and details of any future programs; and,

6. plans for reclamation of all disturbed areas with the primary objective of returning the site to wildlife capability as close as possible to previous levels prior to disturbance.

A foremost concern for MELP is the sub-alpine/alpine habitat. Proponents must be prepared to provide technical justification and support for access proposals in these areas . Alternative locations and technologies must be considered and assessed and a detailed discussion of these issues included with any proposal. MEMPR/MELP will evaluate the proposals and make a decision on siting. Restricted productivity is a recognized characteristic of the alpine habitat, as is the visual impact of any development within the alpine. Many alpine habitats support migration/corridors routes which are critical to maintain. Mitigation strategies to deal with problems associated with reclamation, ie: time to re-establish grass and plant growth and soil, erosion, climate, native species planting, visual effect, and equipment needed to properly scarify and re-seed must be included in the proposal. Connectivity between alpine habitat and the surrounding habitat must be taken into consideration. This is to ensure that escape corridors and post-calving habitats are not at risk.

**Referral Process**

The referral process will follow current procedures, however, the time frame required for each proposal will be examined on its own merits and in relation to other activity or development proposals. Each application should be submitted to MEMPR and processed quickly, as soon as it is known that an activity will take place within the Upper Sikanni. This extra time is needed in order to complete any studies that the proponent will be requested to complete prior to commencing operations.

- *Initial response time will be a minimum of 30 days*
- *Comprehensive development plans are needed in order to properly evaluate each proposal*
- *Impact assessment, monitoring and evaluation plans for air, water, wildlife, fisheries, and terrestrial habitat as well as comprehensive reclamation plans must be submitted with the development plans*
- *Where development has the potential to disrupt fisheries habitat, a fisheries inventory must be completed prior to submitting development proposals*
- *Archeological overview assessments will be required*
- *The operating requirements in the watershed may evolve as the cumulative impacts of activities and knowledge of the area become known.*

**Environmental Monitor**

Project proponents will be required to provide an environmental monitor who will be onsite for all construction activities creating surface distrubances. The monitor will report all findings to MELP, MEMPR and the proponent.

## Specific Guidelines

### Topsoil Salvaging

Prior to construction, all available topsoil (A and B horizon) on the well pad, gravel pit and new access road will be salvaged and stockpiled for use in reclamation. A soil assessment will be conducted to determine the total depth of the A and B horizon, which in turn will be the amount of topsoil to be removed and stockpiled. Topsoil salvaging will not occur during inclement weather or when the soil is significantly wet to cause damage or compaction. Topsoil stockpile areas will be outside traffic areas within the wellpad location. Drainage will be routed around and away from the pile. Topsoil stock piles will be signed and a berm constructed or ditched around the pile to contain all soil. Immediately after stockpiling topsoil will be seeded.

An assortment of boulders and miscellaneous woody vegetation removed from the well pad, gravel pit and access road will be stockpiled. This material will be pulled back and spread over reclaimed areas. The equivalent of 1-2 logs per acre and two or more brush piles (per acre) 10 feet across and 7 feet high will also be stockpiled and placed on reclaimed areas.

### Flight Patterns/Distance

- A 'Coordinated Flight Management Plan' shall be completed and presented to MELP with each referral application. This shall include plans as to where staging areas will be, flight path to be used and hours of operation. The main objective of the plan is to avoid critical wildlife habitat and reduce harassment of wildlife.
- No flights shall take place over critical winter range between December 1st and May 1st.
- All fixed-wing aircraft as well as helicopters must follow the defined flight path to avoid critical habitat zones.
- All fixed-wing aircraft as well as helicopters must maintain an altitude of no less than 500m above ground, following the designated flight path. The main flight path follows the Upper Sikanni, approaching from the east (foothills) and flying directly to the area of interest, maintaining the 500m altitude.
- Following and circling of wildlife is strictly prohibited, unless wildlife studies are being conducted.

### Timing/Seasonal Restrictions

These restrictions will, in most cases, apply to geophysical and pipeline programs. Where applicable, the following timing restrictions will apply also to roads and wellsite activity. These restrictions are site specific and commonly in the pink and green zone.

- Critical ungulate winter range - No activity between December 1st to May 1st.
- Critical lambing and calving grounds - No activity between May 15th to July 1st. *Proponent will be required to conduct inventories to define the critical lambing and calving grounds.*

- Critical rutting - No activity between October 15th to December 31st. *Proponent will be required to conduct inventories to establish these areas as above.*

Restrictions in the watershed may evolve as the cumulative effects of activity and knowledge of the area become know.

**Note:** Management of timing constraints is essential if plan objectives are to be achieved. Flight paths will be assessed in relation to each species as to where and when lambing and calving take place. Much of conditions 1 - 4 (timing constraints), and most critical winter ranges, coincide with the High Sensitivity Habitats which are shown on the attached map. Restraints such as critical rutting areas cannot be mapped as they are not necessarily habitat related and site specific ground truthing will be required.

**Fisheries**

- Where there may be an impact to fishery resource and habitat, a site specific fisheries inventory and habitat assessment must be completed prior to submitting development proposals.
- Two specific zones exist along all rivers/streams. The first coincides with the riparian habitats along all rivers/streams. The second is the critical instream habitat zones which are marked on the annotated map. These critical fishery habitat zones were identified using fishery maps and locating Class 3 LODs (Large Organic Debris) and Class 3 pools.
- Crossings of the rivers will be determined by habitat and terrain. The proponent is expected to produce an assessment showing various crossing options, so that with the aid of site specific investigation, the most appropriate crossing can be determined.

**Water and Water Crossings**

- Access to and use of the water sources will be examined on a site specific basis and must be approved by MELP.
- All 'significant stream' crossings must be made with clearspan removable bridges. Significant streams are: Sikanni Chief River, Trimble Creek, Kohler Creek, Jesson Creek, Sidenius Creek, Colledge Creek, Gorrie Creek, Millet Creek, Loranger Creek, Chicken Creek, Bartle Creek, Embree Creek, Gautschi Creek and Moose Lick Creek. Where smaller or unnamed crossings are involved, clean snowfills may be accepted.
- No development within 500m of Marion Lake, Beattie Lake, Cranswick Lake, Colledge Lake and The Sikanni Chief Lakes (Pass Lakes). A variable width disturbance buffer will be employed around all other lakes and ponds. The width of the buffer will be determined by site specific factors such as visual impacts, erosion potential, surrounding habitat class, fisheries values and type of development. Access for geophysical exploration, pipelines and roads will be permitted but should be avoided if possible.

- No development within 500m of the following rivers and creeks: Sikanni Chief River, Trimble Creek, Kohler Creek, Jesson Creek, Sidenius Creek, Colledge Creek, Gorrie Creek, Millet Creek, Loranger Creek, Chicken Creek, Bartle Creek, Embree Creek, Gautschi Creek and Moose Lick Creek. Access for geophysical exploration, pipelines and roads will be permitted but should be avoided if possible.

**Geophysical Operations**

- Seismic operations will be heliportable only, with avoidance/handcut lines not to exceed 1.5 meters width. Avoidance handcut methods should be used, where possible, to provide line-of-sight, rather than cutting trees down.
- Conventional operations may be approved where there are existing conventional lines.
- Seasonal restrictions on all seismic operations will apply between May 15th and July 1st. Where critical ungulate winter range and critical rutting areas are verified the following restrictions will apply:
- Winter range: No activity between December 1st and May 1st.
- Rutting range: No activity between October 15th and December 31st.
- Adjustment may be required to seismic programs that propose lines that run directly through or alongside critical habitat.
- Coordination of seismic programs must be demonstrated where possible. Use of existing lines must occur where appropriate. There is recognition that technical and competitive limitations need to be addressed when sharing data and is dependent on where the below ground structures lie. Where existing seismic information is available, the proponent is expected to attain this data.
- Ensure that all slashers are equipped with anti-spill spouts and absorbent pads when they arrive at the job-site.
- Trees near major rock faces do not impede line-of-sight and should be left standing.
- Lines should not be closer than 400m of each other or existing lines ( existing lines defined as being those lines where regeneration does not exceed 2m ). Where any seismic line intersects a point of access (i.e. a road, trail, another seismic line, etc.) the line is to be dog-legged.
- Reclamation plans for blowouts are to be in place before recording begins. If a blowout occurs, reclamation of the blowout will occur the next day.
- Any seismic line which progresses into the subalpine and alpine habitats will be expected to leave no trace of their activities within these habitats.
- Length of lines will be examined as to whether shorter lines could be possible without jeopardizing the end results; it is realized that rock structure and depth of possible zone are determining factors and that 'the shorter the line the shallower the zone'
- Where the use of vibrosies or airgun techniques are possible they may be requested as an alternative to dynamite.

- A reclamation plan must be submitted with each seismic program that includes:

* Trash removal. (eg. flagging tap, containers and debris)
* Felled trees will be bucked to lie flat to the ground.
* Any damage to the duff layer will be repaired to prevent erosion
* Access from either end of the line must be blocked; where ATV access is not possible or where next years growth will provide some screening abilities, this may not be required.

As information and activity evolves, requirements and conditions may vary.

**Roads (access/closure)**

Access management and control is key to achieving the objectives of the USMP. Access control measures will be required to minimize or eliminate vehicular traffic not related to development activity. It should be noted that recreational trails already exist in the Upper Sikanni. Oil and gas industry vehicles, may be subject to weight restrictions, limits on daily number of vehicles using the access. Measures may include:

- A coordinated access route developed using the concept of a single mainstream road, and a single pipeline route to minimize access. This route must be used by all operators to access the Upper Sikanni drainage.
- Measures such as controlled access and/or access closures may apply to other corridors, where there is a demonstrated need. This may include a variety of measures such as: gates, berms, excavation and slash placement. An effective measure for permanent access closure in this watershed, where it is agreed that closure is needed, will include steep slope recontouring coupled with the distribution of large scattered rollback material, bridge/culvert removal, surface diversion berms for erosion control and vigorous regrowth for screening.
- Access for exploratory wells, will be limited to temporary, winter-use roads only. Exceptional circumstances may warrant change and specific approval must be granted by the Assistant Deputy Minister, Energy Resources Division, and Petroleum Resources, (ADME), in consultation with MELP.
- Travel on temporary roads is restricted to the period between November 1st and March 31st. No vehicular equipment is to be moved on or after March 31st unless specifically approved by the ADME, in consultation with MELP.
- Coordination of use of main road must be demonstrated.
- A maximum vehicle use restriction may apply to all access routes.
- All significant stream crossings must be made with clearspan removable bridges.
- Long, direct line of site situations must be avoided.
- Any road widening could be accomplished by lowering the existing road and not by cutting into backslopes.
- Where steep cutslopes exist, they will be serrated, roughened or benched to allow catchment areas for broadcasted seed.

- Seeding of roadsides must be done using plant/grass species unpalatable to wildlife, to reduce wildlife-vehicle collisions and conditions that promote poaching.
- Traffic speeds may need to be posted and adhered to. The objective is to reduce dust and reduce the potential for animal-vehicle collisions.
- Several options for pipeline and access corridors/crossings will be developed . These routes may not be the most economical routes, as other factors will be considered. These corridors/crossings may change as field studies and data acquired from proponent impact assessments are interpreted and increase knowledge.
- All gravel sources are to be authorized by BC Lands, and similar to the well pad, any gravel pit will have the topsoil stripped and stockpiled for use in reclamation.

**Exploratory Wells/Drilling/Well Pads**

- Directional drilling must be considered, if technically feasible, in lieu of further road development or further critical habitat alteration. The use of extended reach directional drilling and multiwell pads is recommended where possible.
- Remote sumps or sumpless systems are to be used.
- The monitoring of wellsites remotely is recommended within the Upper Sikanni.
- Geotextile matting to reduce lease disturbances and conserve natural vegetation/topsoil is recommended.
- The use of benign mud systems is recommended.
- Initial drilling start up date is November 1st and breakup date is March 31st. No equipment to be moved before or after that period (unless otherwise agreed upon).
- Wellsites may be required to have fencing installed around the perimeter of each site. Sumps/tailing ponds will be fenced.
- All noise sources must be insulated.
- A closed drilling system is to be used in all drilling operations within the Upper Sikanni unless otherwise approved by MEMPR. Use of a closed system greatly reduces the size of reserve pits associated with drilling activities, further reducing well size. Use of the closed system significantly reduces the potential for contamination of shallow groundwater aquifers with drilling fluids.
- All wellsite locations should be located where cut and fill slopes could be minimized.

The well pad design should incorporate berms and a containment pit should be constructed to retain all runoff and sediment produced on site. The pad will have diversion channels on its perimeter to keep runoff from undisturbed areas from draining onto the pad (these will be rip- rapped). Energy dispersion

structures will be installed to ensure that diverted runoff is adequately controlled and erosion at discharge points is minimized. Each pit will be lined with a non-permeable synthetic liner to isolate fluids in the pit from shallow groundwater. The small reserve pits would be similarly lined.

- If the wellsite is successful, areas on the well pad not required for future production will be reclaimed. This would involve bringing all slopes back to their original grade and seeding the disturbed areas. It may also be necessary to install silt barriers at selected locations to control off-site sedimentation until vegetation is reestablished on the disturbed areas. The well pad will be fenced.
- All gravel sources are to be authorized by BC Lands, and similar to the well pad, any gravel pit will have the topsoil stripped and stockpiled for use in reclamation.

**Pipelines**

- A single mainstream pipeline route has been defined in the plan. This route must be used by all operators.
- Separate pipeline corridors/crossings will be defined; these routes may not be the most economical route, as other facotrs will be considered. These corridors/crossings may change as field studies and surface/sub-surface data acquired from proponent impact assessments are provided.
- Routes will consider ecological as well as economic issues and be assessed on a site specific basis. Any route chosen will have taken into consideration several variables and will have been developed through consultation with the proponent.
- To utilize any pipeline route to its full potential certain factors of construction will be assessed: eg. pipe size - large enough to eliminate the need for more pipelines, the laying of several pipelines within one corridor and width of right-of-ways (18m - 20m maximum).
- If pipeline access can be drilled to a wellsite which is situated in critical habitat such as alpine, then this method will be the preferred method.
- The proponent will be required to produce an impact assessment describing alternative routes possible, which may or may not include idenfied routes.

**Waste**

- Where vehicular traffic is used, efforts should be made to minimize vehicular traffic in disposing of waste water and other by-products.
- A closed mud system will be utilized, however a reserve pit may be required for cuttings and produced fluids, the mud being circulated for reuse. The pit will be lined with a 18 mil synthetic liner, depending on site characteristics. It will be fenced with a stock tight wire mesh fence. Following drilling, the liquid waste may be evaporated, trucked out injected down the wellbore or irrigated on the surface, and the pit will be backfilled and returned to natural grade and reclamation will then take place.
- Refer to the Waste Management Act for daily camp waste disposal.

**Facilities/Power Lines**

- All petroleum and gas processing facilities will be located outside the USMP area.
- Where feasible dehydration facilities will be situated outside the boundaries of the USMP area.
- Alternatives to running overhead lines will be considered where right-of-way crosses through wetlands, marshes.

**Personnel/Camp Management**

The following conditions are intended to reduce any negative impacts of human habitation:

- Company housing and/or camp facilities must be located outside the USMP area.
- MELP maintains authority to limit firearms in USMP.
- Refer to the Waste Management Act for daily camp waste disposal.

# RECLAMATION
## Reclamation Guidelines for the USMP

Reclamation plans must be submitted and approved as part of the construction permitting and approval process. Objectives of reclamation in the Upper Sikanni is to return the site to a condition where self-sustaining native vegetation provides:

1. Wildlife habitat capabilities equal to or greater than initial conditions.
2. Erosion control equal to or greater than conditions found on adjacent undisturbed sites.

Immediately following completion of a pipeline, abandonment of a wellsite, or the abandonment of any road, a complete reclamation of the subject lands will take place. Where seasonal barriers prevent the reclamation of any site, the proponent must begin reclamation as soon as seasonal barriers have changed.

If the wellsite is successful all areas on the well pad not necessary for eventual production will be reclaimed. This would involve bringing all slopes back to their original grade and seeding the disturbed areas. It may also be necessary to install silt barriers at selected locations to control off-site sedimentation until vegetation is reestablished on the disturbed areas. The well pad will be fenced.

### Recontouring

All cuts that are made in steep or rolling terrain will be regraded and recontoured to blend into the surrounding landscape and to reestablish the natural drainage patterns. Emphasis during recontouring should be to return the disturbed areas to its original contour, to stabilize slopes, control surface drainage and to provide a more aesthetic appearance. Ruts and other scars should also be filled.

### Scarification

Prior to re-spreading topsoil, disturbed areas will be scarified to loosen areas compacted by equipment traffic. Scarifying by ripping would promote water infiltration, better soil aeration and root penetration. In sloping areas scarification would also be important to provide a roughened interface between the topsoil and subsoil which would reduce the potential for soil slippage.

Ripping should be at least 12 inches deep and spaced no more than 16 inches apart. Scarification equipment may be required to make multiple passes over the same area to adequately relieve compaction. Ripping should be conducted when materials are dry to improve shattering of compacted layers. Every effort should be made to scarify along the contour to reduce erosion.

**Topsoil**

Prior to construction, all available topsoil (A and B horizon) on the well pad, gravel pit and new access road will be salvaged and stockpiled for use in reclamation. A soil assessment will be conducted to determine the total depth of the A and B horizon, which in turn will be the amount of topsoil to be removed and stockpiled. Topsoil salvaging will not occur during inclement weather or when the soil is significantly wet to cause damage or compaction. Topsoil stockpile areas will be outside traffic areas within the wellpad location. Drainage will be routed around and away from the pile. Topsoil stock piles will be signed and a berm constructed or ditched around the pile to contain all soil. Immediately after stockpiling topsoil will be seeded.

An assortment of boulders and miscellaneous woody vegetation removed from the well pad, gravel pit and access road will be stockpiled. This material will be pulled back and spread over reclaimed areas. The equivalent of 1-2 logs per acre and two or more brush piles (per acre) 10 feet across and 7 feet high will also be stockpiled and placed on reclaimed areas.

Salvaged topsoil should be spread uniformly over the disturbed areas. If compaction occurs during topsoil spreading, scarification would be necessary unless it could be relieved by equipment used for seedbed preparation. Topsoil spreading should not occur during wet periods when soils are easily compacted. Travel over newly topsoiled areas would be restricted. A trackhoe should be used to spread topsoil (approximately 2 inches depth) on steep cut and fill slopes wherever feasible.

**Seeding**

Immediately after stockpiling, topsoil of any disturbed area will be seeded with a mixture that is in accordance with the guidelines set out in the Oil and Gas Handbook; consultation with B.C. Environment is recommended.

**Maintenance/Monitoring**

Long-term monitoring is required to assure that revegetation is successful and erosion from disturbed areas is controlled. In the late spring or early summer in the first year after seeding a determination would be made by the proponent and MELP as to the need to fertilize seeded sites for improved establishment. Maintenance/monitoring is required until entire site is revegetated with native species and erosion potential is equivalent to the surrounding undisturbed areas.

**ROADS - RECLAMATION**

1. All precautionary measures, such as cross ditches and water bars, to prevent soil erosion and sedimentation to streams must be taken immediately after the road is put to bed.

2. All stockpiles from disturbed areas are to be seeded.

This prevents loss of soils due to erosion, as seeding will stabilize soils and provide vegetative cover until reclamation begins.

3. Seeding requirements to meet reclamation objectives will be done in consultation with Ministry of Forests and BC Environment.

   Seed mixes which allow re-establishment of native species should be used in reclaiming disturbed areas.

   Seed mixes must possess the following characteristics: fast growing, self-sustaining, little to no maintenance requirements and create limited fire hazard.

   It is critical that certified seed be used and does not contain noxious weed seeds. The seed types and species are prescribed by the Ministry of Forests.

   When seeding newly cleared areas to prevent erosion, avoid species attractive to bears. Benefits to a bear from roadside forage rarely outweigh the disadvantages of being close to roads.

   All road construction within provincial grazing reserves must be seeded as specified by the Ministry of Forests.

4. Seeding should be done after the spring thaw or in late fall.

   Soil moisture levels are most favorable for seed germination and seedling survival during the spring and early summer.

5. Where seeding cannot be carried out during the optimum period for germination, increased seeding rates and fertilizer applications must be employed to ensure successful revegetation.

6. Apply fertilizers prior to or during the seeding of disturbed areas.

   The objective is to provide sufficient nutrient concentrations in the topsoil. The nutrients most commonly found lacking in the soils are nitrogen, phosphorous and sulfur. If soil conditions are unknown a soil analysis may be necessary to determine the type and amount of fertilizer required. No fertilizers to be applied within 10m of any stream.

7. Disturbed sites should be contoured as closely as possible to naturally appearing topography and an appropriate soil profile.

Specific site prescriptions will detail proposed end use and activities necessary to meet this use. Roads on environmentally sensitive areas will require complete recontouring.

8. Soil profile compaction on disturbed areas may have to be loosened to assist root penetration and soil moisture penetration.

9. On sites where erosion control problems are identified mulch may be required to hold seed in place. On disturbed slopes this will control erosion until vegetative cover is established, improves moisture retention and prevents surface crusting of the soil.

   Where biodegradable straw mulch is used it should be covered with natural fibre netting held in place by wooden pegs. Cellulose fiber mulches should be used to hold seed in place on very steep slopes.

   Asphalt mulch will not be used as it tends to seal soil and contribute to excessive heat absorption.

   Where brush mulch is used, limbs and small stems should be mechanically crushed after disposal. Properly deposited slash will assist in erosion control and revegetation by providing microsites for seed germination and plant growth; decomposition will provide additional nutrients thus improving reclamation capability. Mats are cost-effective in areas where sites would otherwise require regrooming and reseeding several times before they are stabilized.

   Chemical binders or soil stabilants are applied in aqueous solution for the purpose of penetrating the soil surface and reducing erosion by physically binding soil particles.

   Chemical soil binders should be used to protect disturbed soil from wind and water erosion during delays in grading operations and also during hot and dry periods after final grading.

10. Slopes that are steep, dry or south-facing, characterized by sensitive soils or where vegetation establishment would be difficult, may require more intensive efforts to hold soil in place until vegetation is re-established.

11. Fertilizer and chemical binder/soil stabilizers application methods must prevent entry of these products into streams.

12. Abandoned pits should be stabilized by recontouring where possible and revegetating.

    They must be replaced in the proper sequence over the recontoured pit area. Topsoil is to be salvaged from all over burden and aggregate stockpile sites.

**BRIDGES -** (Please also refer to Road Reclamation guidelines)

1. Procedures for abandonment:
   - Remove all structures, block maintenance roads and remove culverts.
   - Remove all the unstabilized fill material from the site and reslope and seed all unstable areas. Where erosion has occurred, contour the streambanks to as near original shape as possible.
   - Take measures to prevent vehicular access across streams.

2. Restore all disturbed areas adjacent to the stream to finished, stable slopes using appropriate methods such as seeding, planting, mulching, placing mat binders, soil binders, rock or gravel blankets or terracing on long slopes.

3. Apply slow release fertilizers prior to or during the seeding of disturbed areas.

   Conduct a soil analysis to determine the type and amount of fertilizers required. The objective is to provide sufficient nutrient concentrations in the topsoil; the nutrients most commonly found lacking in the soils are nitrogen, phosphorus and sulfur. If non slow release fertilizers are used, fertilizing should be done after germination.

**DRILLING -** (Please also refer to Road Reclamation guidelines)

1. Additional backfilling and recontouring may be required to make allowances for settlement and establishment of the appropriate grade. Stockpiled topsoil and overburden shall be spread in an appropriate profile over the site. The entire site should be revegetated.
2. After completion of all initial cleanups, sumps should be mounded up above the original level (extremely important during the winter months).
3. Surface drainage shall be diverted around disturbed areas; where this is not possible, erodible material must be protected by rip-rap or some other acceptable means.
4. Restore any natural drainage, volume and route, as near as possible to its original state.

# APPENDIX A
# CONDITIONS OF TENURE

## Existing Oil and Gas Tenure

There are number of existing tenures located within the USMP. Those tenures will be subject to the general guidelines section of the USMP .

## Oil and Gas Tenures proposed for disposition on December 13, 1995

1. All oil and gas exploration and development activities must conform with the operational guidelines set out in the Upper Sikanni Management Plan.

2. Flight management plans will be required to address wildlife concerns.

3. No development will be permitted within 1 Km of Trimble Lake.

4. Where significant impact to fishery resource and habitat is anticipated, site specific fisheries inventories must be completed prior to submitting development proposals.

5. Directional drilling should be considered in lieu of further road development.

6. Development proposals must include plans for deactivation and rehabilitation of all new roads and trails.

7. All significant road stream crossings of those streams identified in the Upper Sikanni management Plan, are to be made with clearspan removable bridges.

8. Efforts should be made to minimize vehicular traffic in disposing of waste water and other by-products.

9. Major gas processing facilities should be sited outside the Upper Sikanni Chief River drainage.

10. Seismic operations will be heli-portable with hand cut lines not to exceed 1.5 meters width. Use of existing lines must be considered where appropriate. Conventional operations may be approved where there are existing conventional lines. Efforts must be made to co-ordinate geophysical exploration surveys.

11. Site specific restrictions will apply to all geophysical exploration surveys and pipeline construction as follows unless special circumstances warrant and prior approval is obtained:

a) Operations will be prohibited in areas of critical ungulate winter range from December 1 to May 1.
b) Operations will be prohibited in critical lambing and calving grounds from May 15 to July 1.
c) Operations will be prohibited in critical rutting areas from, October 15 to December 31.

12. Habitat impact assessments will be required for all exploration and development proposals. ***(Define activities in detail)***

13. Existing designated routes must be used to access the Upper Sikanni Chief River drainage.

14. Co-ordination of use of main access road must be demonstrated. Gating and additional physical control measures may be required.

15. a) Access for exploratory wells will be limited to temporary, winter-use roads only unless exceptional circumstances warrant and specific approval is granted by the Assistant Deputy Minister, Energy Resources Division, (ADME).

b) Travel on temporary roads is restricted to the period between November 1 and March 31. No vehicular equipment is to be moved on or after March 31 unless specifically approved by the ADME.

c) Should exploratory drilling confirm the presence of commercially viable quantities of natural gas, proposals for all season roads will be accepted and evaluated.

16. ***Access Requirements in Sensitive Habitat Areas.***
*( Shaded pink and green on the Upper Sikanni Management Plan USMP map)*

a) Well sites and related facilities ***(define)*** will not be approved in areas shaded pink on USMP map inclusive of riparian areas, cold air drainage, shrub grassland, avalanche chutes, warm aspect grassland and warm aspect forest. Access routes through these areas should be avoided if possible.

b) In Green areas alternate exploration technologies such as directional drilling should be considered and evaluated before proposing new access in sensitive green areas. Proposals for access in sensitive areas defined in the Upper Sikanni Management plan must include detailed plans describing exploration efforts to date, and a detailed justification of the need to construct the access and for the location of a wellsite. The proposal must include potential development scenarios and infrastructure requirements, together with a detailed description of impact mitigation strategies which are consistent with the habitat plan.

17. Existing recreation trails in area; related access and site restrictions may apply.

18. Sensitive visual quality area; visual impact assessment may be required.

19. Potential for archaeological resources exists; overview assessment may be required.

20. Parcel is located in an area traditionally used by the Halfway River First Nation; Consultation with the Nation may be required.

21. ***Special caveat for parcel 951059 re buffalo calving area.***
Access and wellsite location will be prohibited in buffalo calving area delineated on USMP map.

22. ***Special caveat for parcel 951055, 951060B, 951060C***
Parcel contains traditional use site of significance to the Prophet River First Nation; consultation with the Nation may be required.

23. ***Special caveat for parcel 951060B***
Potential for macro-paleontological resources may exist in the Chicken creek area; for more detailed information on possible site location contact Prophet River First Nation

# APPENDIX B
# HABITAT USE BY LISTED SPECIES

| Common Name | | | | | | | | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moose | Y | X | X | X | X | X | X | X | X | | X | X | Associated with early seral, shrubby habitat. Riparian areas and emergent vegetation in lakes important summer food sources. |
| Plains bison | B | | X | X | X | X | | X | X | | | | Shrub/Grass Lowland provides critical winter range. Some subalpine/alpine areas are important calving habitat. |
| Rocky Mountain elk | Y | X | X | X | X | X | | X | X | | | | Depend on open, grassy habitats for foraging; may include alpine. Forested types needed for thermal and hiding cover. |
| Caribou | Y | X | X | X | X | X | X | X | X | | | | Alpine important for winter range. Open pine/spruce forest with significant terrestrial lichen cover may also provide important winter range. Calving may occur in high elevation, rocky, forested areas. |
| Stone's sheep | B | | | | X | | X | X | X | X | | | Closely associated with alpine habitats. Sensitive to disturbance particularly during lambing time and in winter. Winter range limited. Low elevation mineral licks may be used extensively. |
| Mountain goat | Y | X | X | | | X | X | X | X | X | | | Requires rocky terrain for escape cover. Normally associated with alpine but not uncommon in rocky canyons of rivers or forest types near rock bluffs and talus slopes. Associated with south aspects of these habitats in winter. |
| Mule deer | Y | X | X | X | X | X | | X | X | X | | | Warm aspect grassland critical for winter range. Forest openings and alpine may provide summer habitat. |
| White-tailed deer | Y | X | X | | X | X | | | | | | | Dependent on snow intercepting forest cover with herb/shrub understory for winter use. Uncommon in Upper Sikanni area. |
| Black bear | Y | X | X | X | X | X | X | X | X | | | X | Warm aspects and road/pipeline right-of-ways heavily used in spring. Riparian and early seral habitats important. Den in rock crevices or at base of large spruce or cottonwood. |
| Grizzly bear | B | X | X | X | X | X | X | X | X | | | X | Riparian and avalanche chutes used extensively for foraging. Burned areas may provide important berrying habitat. Den in high elevation, high snowfall locations. Sensitive to human activity. |
| Western wolverine | B | X | X | X | X | X | X | X | X | X | | X | Depend on ungulate carrion. Availability and diversity of large mammals underlies the distribution, survival and reproductive success of wolverines. Sensitive to human activity and development. |
| River otter | Y | | | | | X | | | | | X | X | Restricted to river and stream corridors but utilizes adjacent forest for denning purposes. |
| Beaver | Y | | | | | X | | | | | X | X | Limited to watercourses where there is an adequate supply of adjacent deciduous forest. |
| Marten | Y | X | X | | | X | | | | | | | Requires mature coniferous forests with abundant small mammal prey populations. Coarse woody, debris is an important habitat feature. Closed canopy forests are preferred habitat type. Large forest openings limit martin use. |

| Common Name | | | | | | | | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fisher | B | X | X | | | X | | | | | | | Follow hare and porcupine distribution. Limited by deep snow, requires closed canopied mature forests for winter habitat in heavy snowfall areas. Wildlife trees used for denning. Large forest openings are avoided. |
| Lynx | Y | X | X | | X | X | | | | | | | Follow hare abundance and distribution almost exclusively. Seral forest stages important for maintaining hare populations. |
| Mink | Y | | | | | X | | | | | X | X | Limited to streams, lakes and other wetland areas. Dependent on riparian habitat and associated prey species. |
| Long-tailed weasel | Y | X | X | X | X | X | X | X | X | | X | X | Use a variety of habitats with abundant small prey. Coarse woody debris and cover from aerial predators important. |
| Northern Flying squirrel | Y | X | X | | | X | | | | | X | X | Use extensive forest lands with some trees 17m or more in height. Declines in population could indicate fragmentation of habitat. |
| Red squirrel | Y | X | X | | | X | | X | | | | | Dependent conifer forests where it feeds on conifer seeds and mushrooms. Nests in tree cavities. |
| Red fox | Y | X | X | X | X | X | | X | X | X | X | X | Prefer edge habitat such as that bordering the shrub/grassland meadows and warm aspect grasslands. Also use early seral stages of forests with openings such as might be created by fire. |
| Coyote | Y | X | X | X | X | X | X | X | X | | | X | An adaptable predator utilizing a wide range of habitat types but preferring open habitats and edges. |
| Gray wolf | Y | X | X | X | X | X | X | X | X | X | X | X | Use seismic lines, other Right-of-ways and frozen lakes and rivers as travel corridors. Distribution dependent on ungulate prey populations and distribution. |
| Smith's Long- Spur | B | X | X | X | X | | | X | X | X | | | Breed in alpine and subalpine habitats. Also use forest openings such as shrub/grassland meadows and man-made openings. |
| Mountain bluebird | Y | | X | X | X | | | X | | | | | Found mainly in semi-open habitats such as subalpine parkland areas and early second growth forests. Nests in cavities in trees, rock and soil. Feeds mainly on insects. |
| Purple finch | Y | X | X | | | X | | X | | | | | Arboreal nester (3-6m above ground). Coniferous and deciduous forest. Feed on buds and seeds in winter. |
| Pileated woodpecker | Y | X | X | | | X | | | | | | | Prefers closed canopy coniferous forest where intrusions of deciduous growth such as aspen occur. Create cavities that may be used later by cavity nesting animals. |
| Boreal chickadee | Y | X | X | | | X | | | | | | | Inhabits northern coniferous forests. Insect feeder. Nest in small cavities usually close to the ground. |
| Northern flicker | Y | X | X | | | X | | | | | | | Use open forests and other sparsely treed habitats or forest openings. Create cavities for nesting, preferring aspen or pine with varying stages of decay. Abandoned cavities utilized by numerous other cavity nesting species. |
| Blue grouse | Y | X | X | X | X | X | | X | X | | | | Occupy a variety of forested habitats. Tend to breed in forests adjacent to open habitats such as burned or logged areas, meadows and alpine. |

| Common Name | | | | | | | | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| White-tailed ptarmigan | Y | | | | | | X | X | X | X | X | X | Use highest, least vegetated mountainous habitat. They may also occur in logged or burned subalpine areas. Tend to winter at lower elevations. |
| Northern shrike | Y | X | X | X | X | X | X | X | | | | | Use open habitat with a perching site such as a snag. Breed in subalpine shrubland habitat. |
| Gyrfalcon | B | | | | X | | X | X | X | X | X | X | Wherever abundant prey species exist: Ptarmigan, shorebirds, and waterbirds. Nests on cliffs. |
| Peregrine falcon | R | | | X | X | X | | X | | | X | X | Nests on cliffs above lakes or river canyons. Very rare in the BC Interior. |
| Northern goshawk | Y | X | X | | | X | X | X | | | | X | Primarily a forest bird. Hunts in open areas such as grasslands, meadows, marshes, etc.. Usually breed in interior of large tracts of coniferous forests; heavily impacted by logging. |
| Bald eagle | B | X | X | X | | X | | | | | X | X | Usually associated with water but may be found almost anywhere. May utilize carrion where available. Nest in tall snags or old growth trees near water. |
| Golden eagle | Y | X | X | X | X | X | X | X | X | X | | | Forage over any open habitat with abundant prey. May nest in trees but more often on cliff edges. May utilize carrion where available. |
| Boreal owl | Y | X | X | X | | X | | X | | | X | | Cavity nester, preferring closed, mixed forest types. May breed at isolated locations at high elevations. |
| Great Grey owl | Y | X | X | X | X | X | | X | | | X | | Found in all types of timbered habitats, and also frequents river valleys, lakeshores and agricultural areas. Nest in old hawk nests in trees, holes in cliffs, clay banks and man-made structures. |
| Barrows goldeneye | Y | X | X | | | X | | | | | X | X | Nest in large natural cavities or cavity made by pileated woodpecker in conifer or deciduous trees. Will readily use a nest box. Nests must be near rivers, lakes and wetlands. |
| Harlequin duck | Y | | | | | X | | | | | | X | Use fast running, turbulent streams and nest on the ground immediately adjacent. |
| Northern pintail | Y | X | X | X | | X | | | | | X | X | Usually nest near water but may be found in grassland areas, meadows, forests and subalpine bogs. |
| Green-winged teal | Y | | | X | | | | | | | X | X | Use emergent vegetation associated with marshes and lakes. |
| Common loon | Y | | | | | | | | | | X | X | Breeds on large and small lakes, in forested and open areas, and occasionally on marshes and rivers. Nest on shore on islands or partially submerged debris close to shore. |
| Hoary marmot | Y | | | | | | X | | X | X | | | Inhabits alpine tundra, denning on rocky or talus slopes often under large boulders. Feed heavily on grasses and forbs from late April to late august. Hibernate for eight months of the year. |
| Northern Bog lemming | Y | X | X | | | | | X | X | | | | Frequents black spruce bogs but may also be found in deep mossy spruce woods, wet subalpine meadows and alpine tundra. |

| Common Name | | | | | | | | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Meadow vole | Y | | | X | | | | | | | | | Usually inhabits wet meadows where there is a protective carpet of grasses or mosses. It avoids deep forests and high, dry grassland. |
| Gappers Red-backed vole | Y | X | X | | | X | | | | | | | Prefer conifer forest habitats, utilizing coarse woody debris for cover. Is an important prey species for many raptors and mammalian predators. |
| Pygmy shrew | Y | | X | X | | | | X | | | | | Found most often in forest openings and grassy meadows; also in sphagnum bogs or in the shrubby borders of bogs and wet meadows. Smallest mammal in North America. Feed on insects and young mice. |
| Little Brown bat | Y | X | X | X | X | X | | X | | X | X | X | Exploits a wide range of habitats. Hunt over lakes and streams and in forest openings. Summer roost in tree cavities, rock crevices, caves and under the bark of trees. Hibernate in caves and abandoned mines. |
| Northern Long-eared myotis | Y | X | X | X | X | X | | X | | | X | X | Occurrence noted at Hudson's Hope. May occur in the boreal forest type in Sikanni watershed. |

# APPENDIX C
# HABITAT USE BY WILDLIFE SPECIES EVALUATION LIST

| Habitat | Red | Blue | Yellow |
|---|---|---|---|
| Closed Forest | | 5 | 31 |
| Open Forest | | 6 | 33 |
| Shrub/Grass Lowland | 1 | 5 | 31 |
| Warm Aspect Grassland | 1 | 6 | 18 |
| Riparian | 1 | 5 | 34 |
| Avalanche Chute | | 4 | 12 |
| Subalpine Meadow Park | 1 | 6 | 24 |
| Vegetated Alpine | | 6 | 15 |
| Sparsely Vegetated Alpine | | 4 | 8 |
| Lakes | 1 | 2 | 17 |
| Streams | 1 | 4 | 19 |

# APPENDIX D

## COMMON AND SCIENTIFIC NAMES OF ANIMALS AND PLANTS WITHIN THE UPPER SIKANNI WATERSHED

| Common Name | Scientific Name |
|---|---|
| **Fishes** | |
| Arctic grayling | Thymallus arcticus |
| Burbot | Lota lota |
| Dolly Varden | Salvelinus malma |
| (includes Bull trout) | Salvelinus confluentus |
| Mountain whitefish | Prosopium coulteri |
| Rainbow trout | Oncorhynchus mykiss |
| **Mammals** | |
| Beaver | Castor canadensis |
| Black bear | Ursus americanus |
| Caribou | Rangifer tarandus |
| Coyote | Canis latrans |
| Gappers Red-backed vole | Clethrionomys gapperi |
| Gray wolf | Canis lupus |
| Grizzly bear | Ursus arctos |
| Fisher | Martes pennanti |
| Hoary marmot | Marmota caligata |
| Little Brown bat | Myotis lucifugus |
| Long-tailed weasel | Mustela frenata |
| Lynx | FelisLynx |
| Marten | Martes americana |
| Meadow vole | Microtus pennsylvanicus |
| Mink | Mustela vison |
| Moose | Alces alces |
| Mountain goat | Oreamnos americanus |
| Mule deer | Odocoileus hemionus |
| Northern Bog lemming | Synaptomys borealis |
| Northern Flying squirrel | Glaucomys sabrinus |
| Northern Long-eared myotis | Myotis septentrionalis |
| Plains bison | Bison bison |
| Pygmy shrew | Microsorex boyi |
| Red fox | Vulpes vulpes |
| Red squirrel | Tamiasciurus hudsonicus |
| River otter | Lutra canadensis |
| Rocky Mountain elk | Cervus elaphus |
| Stone sheep | Ovis dalli |
| Western wolverine | Gulo gulo |
| White-tailed deer | Odocoileus virginianus |

| Common Name | Scientific Name |
|---|---|
| **Birds** | |
| Bald eagle | Haliaeetus leucocephalus |
| Barrows goldeneye | Bucephala islandica |
| Blue grouse | Dendragapus obscurus |
| Boreal chickadee | Parus hudsonicus |
| Boreal owl | Aegolius funereus |
| Common loon | Gavia immer |
| Golden eagle | Aquila chrysaetos |
| Great Grey owl | Strix nedulosa |
| Green-winged teal | Anas crecca |
| Gyrfalcon | Falco rusticolus |
| Harlequin duck | Histrionicus histrionicus |
| Mountain bluebird | Sialia currucoides |
| Northern flicker | Colaptes auratus |
| Northern goshawk | Accipiter gentilis |
| Northern shrike | Lanius excubitor |
| Peregrine falcon | Faico peregrinus |
| Pileated woodpecker | Dryocopus pileatus |
| Purple finch | Carpodacus purpureus |
| Smith's Long Spur | N/A |
| White-tailed ptarmigan | Lagopus leucurus |
| **Trees** | |
| Alder | Alnus spp. |
| Aspen | Populus spp. |
| Balsam poplar | Populus balsamifera |
| Birch | Betula spp. |
| Black spruce | Picea mariana |
| Cottonwood | Populus spp. |
| Red-Osier dogwood | Cornus stolonifera |
| Lodgepole pine | Pinus contorta |
| Subalpine fir | Aqbies lasiocarpa |
| White spruce | Picea glau |